

AVIATION

The Oldest American Aeronautical Magazine

APRIL 27, 1925

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XVIII

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17

SPECIAL FEATURES

LATERAL STABILITY

THE AIR MAIL CONTRACTS

A SCHEME OF AERIAL BOMBARDMENT

THE R33 EMULATES THE SHENANDOAH

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Photograph above: Goodyear dirigible, 'Canso', flying over the Atlantic, first leg of the Round the World Squadron.

GOOD YEAR
AVIATION EQUIPMENT

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APRIL 27, 1928

AVIATION

Published every Monday

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AVIATION

VOL. XVIII

APRIL 27, 1925

No. 17

In this issue we print the regulations given out by Col. Post Headquarters covering the contracts for carrying the mail authorized by the Kelly Bill. In effect they constitute no uniformity evidently in the industry, although the actual loads will remain from this issue. As the contractors are permitted to carry other loads, provided they give the mail preference, there should be no difficulty in building up a paying business.

The American Express Co. has gone on record as being willing to undertake the handling of aerial express matter provided some one had some aeroplanes and the other function is out of it. The mail and express matter ought to pay the last expense of a properly managed airway after payment of certain operation over a route where the service was unavoidable. The efficiency and reliability of the present Air Mail Service have educated the thinking part of our business community. The demand for an extension of the Air Mail is nation wide and has been gathering momentum for several years.

The provisions covering the qualifications of the contractors and their responsibility are the result of the experience of the Post Office Department in operating their own service for the last seven years. In order to give them an absolute check on the qualifications of the machines and the pilots, the department will require that both machines and pilots have certificates issued by them. This in itself is an extremely important point and should have a tremendous effect on the industry as a whole. It will only be done in the absence of a federal department entrusted with that task.

The requirements of the Post Office Department will probably cover the minimum, in many particulars. It is to be hoped that they will have the qualifications in mind and prefer to some of the other requirements of the association. It particularly those covering the identification of aircraft. The Universities Laboratories had an airplane register and it adopted the international identification marks and there were several machines flying around with the University markings, for example N-ARCF.

If the department will issue certificates to pilots and machines not actually used to carry mail, they will clarify the situation with regard to safe and reliable operations a great deal. A pilot and a machine that have certificates should have no difficulty in taking business from those unable to get a license. The more fact of a license and classification mark so much for the public's confidence in mail mail.

The effect on the industry of the contracting for Air Mail may be judged from the fact that the department received nearly two thousand communications on the subject before the regulations were announced. Now that the regulations have been made, it influences the various communities to get their contractors in position for the service. If the problems involved

don't the possibility of a successful service, bids will be issued and the question of qualifications will then be considered.

Bringing Flying to the User

THE greatest but steady growth at the number of new private who are getting flying instruction is shown by the increase of the flying schools which are advertising in our Where to Fly page. Twenty-two schools are now running their card and these fields are scattered from coast to coast. There are probably several reasons for this increase and they all show a healthy tendency in the growth of our commercial aviation. Gradually the interest in flying is becoming a flame base operator, that is, he has a permanent operating base with a hangar and repair facilities which when requires his operations. This in turn gives him a more stable and responsible position financially and also makes it possible for him to give a course in training of minimum length is desired. The field has also enables him to keep his shop in better condition and the repair work which is going on, especially during the winter, is very valuable to the student. Probably the most important factor however is the fact that the war trained pilot who can not flown since the association no longer fit to take up piloting on a moment notice. The absorption of the thousands of young men who got free training during the war is steadily decreasing and in the flying school this is just as important as in the dissolution of war surplus stocks to the manufacturers of commercial planes. A new generation of pilots is being raised in the ways of commercial flying and not in the ways of war.

There are still large areas where no training facilities are available, in fact while states have air training schools. Under the new conditions which are existing there is bound to be a growing demand for training but for some time there will be little groups of people in outlying districts who wish to learn to fly but can not leave their home town. In order to solve this problem certain California universities fly in their pupils instead of making their pupils come to the home field. The instructor's permanent field would be near a large city where there is a steady volume of business but if he does not go out from the home base is losing a lot of revenue. When a group of two or three students can be organized as an outlying town the instructor flies out and charges the students only for the instruction actually given. On the cross country trip the instructor often brings one of the students from the base field for cross country training and covers part of the cost in this way. This also certainly spreads the interest in aviation and of groups of students can be organized it will prove profitable as well as a thing to be encouraged by the manufacturers of commercial planes.

should quote prices and delivery after date of contract, in planes in quantities of three, ten, twenty-five and fifty. The successful bidder will be required to furnish a contract bond satisfactory to the Postmaster General on a sum equal to 25 per cent of the amount of the contract. The P.O.D. point and point of delivery will be determined by the Postmaster General, and the bidder must state terms of compensating deficiency and rate at which subsequent deliveries will be made. Bidders are requested to state the discount which will be allowed on payment of invoices if made within 30 days, within 20 days, and within 10 days from and including date of delivery of supplies or services when supplies or services are delivered prior to point of origin or point of destination, and the date of delivery at destination, when supplies are shipped and accepted at destination.

No person shall be received as a contractor for furnishing supplies of any kind whatsoever to the Post Office Department or to the Postal Service who is not a manufacturer or regular dealer in the articles which he offers to supply.

Inter-city Airplane Tour Advocated

Plans for holding an inter-city airplane robbery tour in the United States this year were considered at a meeting last night in Detroit by members of the Inter-city Airplane Association. An committee was appointed to determine the feasibility of holding the tour this year and to formulate definite plans for it, was appointed as follows: H. D. Clark, vice-president of the S.A.E.; Charles Fritsch, W. B. Stoll and W. W. Schreder.

The proposed flying circuit would not be a race but a competition between the reliability and usefulness of the airplanes, like the endurance contests and reliability tours that were conducted in the early days of the industry a quarter of a century ago and which did so much for the mechanical and commercial development of the motor car. Much as ever has been suggested from time to time, particularly by Col. Paul E. Loberger, president of the Ford Motor Company, and George Englehardt, now to be held in Dayton, Ohio, on March 22, at the Engineers' Club.

Many members of the society in Dayton and from neighboring cities and towns are expected to attend the meeting, which will be presided over by a captain at 6:30 p.m. at the Hotel St. Francis, 1000 Main Street, and McCook Field, Dayton, to give the address of the evening. Mr. Jones was formerly a professor at Cornell University but during the war was appointed inspector of the Thomas-Morse Aircraft Corp. in Illinois, N. Y., and then became a lieutenant in the Air Service. After the war he was placed in charge of super-charger work at McCook field.

Among those who took part in the Detroit conference last Saturday were Col. Paul Henderson; W. B. May, chief engineer of the Ford Motor Co.; C. M. Keys, president of the Curtiss Aeroplane and Motor Corp.; R. W. Schreder, manager of the Curtiss Laboratories; Luther E. Bell, traffic manager of the Curtiss Aeroplane and Motor Corp.; W. E. Gandy, manager of Metal Airplane Co.; and Paul G. Zimmerman, vice-president for aviation, H. D. Clark, vice-president, and C. V. Clark, general manager of the Society of Automotive Engineers.

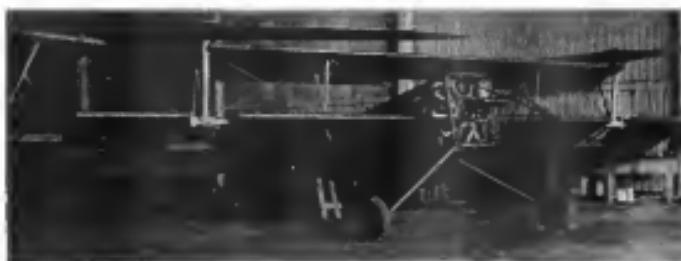
Pilots Wanted

H. W. Schroeder writes that he is in need of five pilots immediately who can handle large Liberty engine planes. He wants every pilot who is in need of a position to write him at the Ford Airport, Dearborn, Mich., giving his qualifications.

Supercharging Airplane Engines

Methods of forcing larger fuel charges into engines and as applied to aircraft, the design of the engine may be modified to accept the better air supply and oxygen content to be obtained at a mounting of altitude of the Society of Automotive Engineers, to be held in Dayton, Ohio, on March 22, at the Engineers' Club.

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The New Berlitz Helicopter

Detroit's Ambitious Aeronautical Program

Packard, Ford, Coffin, Stout, Upson and Verville Have Large Plans

With a sudden rush, Detroit has made a concerted effort to make this the aeronautical center of the country. While others have been thinking of the coming down of planes, the house of the motor car has seized the advantage of position and is planning a comprehensive development of all phases of aviation.

Pord

With the full announcement by Edsel Ford of the establishment of a Ford Aerobus from Detroit to Chicago, the public observed in the first news of the interest of the Ford Company in the transportation development of the country. Since that time, the Ford has tried to extend the Ford's in their manufacturing and there has been more applied publicity of late months, until last week as definite plans were announced. Even now the extent of the development is problematical. The Ford Metal monoplane has been purchased and are being built from the ground up in Chicago as a plane to be used in the mail delivery service. The Ford Airport, with its racing track, its airplane factory and its workshop hangars will be the most complete in the country. But the far-sighted announcement that the Ford Company intends to manufacture small and inexpensive planes and a light commercial engine across the greatest expanse of the country makes for the belief that the success of the great Ford organization will center on a program, it is to be considered to be the result of a very careful analysis.

Coffin

The crowd, and in some ways a more important, Detroit crowd, than the Ford, has a group of engineers headed by Alfred Coffin to present a concern for transport company. This project has already received the consideration of some of the best known men in the country. Until an official announcement of the personnel of the company is made it will not be possible to tell the names of those that have been recruited as partners in this new venture. The company will however, when the plans of the partners are made, set up stock of their to the public. Undoubtedly, it is reported that the company intends to start an experimental air line between New York and Chicago using the Air Mail route for night flying. As the Kelly Biplane now patrols the Post Office Department to carry contracts with private operators and also the Post Office Department of mail, it is believed that the night flying of the Eastern section of the Air Mail may be one of the first undertakings of the proposed company when it is under way. The tentative plan calls for extension of the operations of the air line, in the East as Boston, in the South as far as Atlanta and New Orleans, and West to Los Angeles and Seattle. The plan calls for the use of aeroplanes and dirigibles, and other means to be used to transport passengers. C. M. Keys, president of the Curtiss Aeroplane & Motor Corp., is associated with Mr. Coffin in the organization of the company, the formal plans of which will shortly be made public.

As has been mentioned, the Ford interests in Detroit have formed a company—The Ford-Verville Aircraft Co.—to manufacture airplanes designed by Alfred Verville. The expenditure of manufacturing expenses and engineering skill will make this company one from which much may be expected.

Packard

For one reason, the Packard Company has carried on an extensive engineering development with aeronautical engines. The large Packard engines have recently come to be regarded as one of the standard engines for the Air Service. Under the guidance of Col. J. D. Vincent, the vice-president in charge of Engineering, the Packard Company has conducted

a progressive development program in aeronautical engines that is beginning to play an important part in the engine field.

Of the Stout and Union engineering progress much has been written. The engineering of the Stout, Mr. Stout has been engaged in the production of a motorized airplane. The monoplane has been perfected by practically everyone who has studied the ship. He adopted by the Ford for their air line is a complete endorsement of its utility as an enclosed air transport. Ralph Upson has been making the preliminary arrangements of a study of metal struts, and methods of fabricating them. What has been done has been the most interesting and fundamental idea he has received in the most interested consideration from all parts of the world.

As will be seen, Detroit is taking the aeronautic situation with the most comprehensive seriousness. It has the money, it has the manufacturing facilities and skill, but what is even more important is its persistence in presenting a large and comprehensive plan to develop aviation all along the line.

Philadelphia Sesquicentennial Aviation Committee

Aviation at the Sesquicentennial in Philadelphia in 1936 will be in charge of a committee headed by H. Hollingshead N. Tamm, who is president of the Philadelphia Chapter of the National Aero Club. Alexander C. Clegg, president of the Philadelphia Chamber of Commerce and one of the leading sponsors of aeronautics in the country has assumed the rest of the committee as follows:

Charles J. Shultz, former American aer. Victor Delfin, owner and president of the Philadelphia Royal Aero Club, Aviation Committee; Philadelphia Chamber of Commerce; Col. Robert Glendinning, senior director of aviation; Robert P. Hewitt, of the Lexington Knobell Co.; W. Wallace Killeen, of the Aero Club of Pennsylvania; C. Townsend Ludington, National Aeromarine Assoc.; Louis T. Moore, Makin U. S. Air Service; Frank McR. Egan, Aviation School, Mt. Tabor, Oregon; Dr. Edward C. Allott, Observatory Superintendent, State Bureau, N.G.T.; Harold F. Pitman, president of the Aero Club of Pennsylvania; Joseph A. Sheppard, Council G. G. Westcott, Naval Air Station, Long Island, New York, and Dr. Thomas A. Johnson, of the University of Pennsylvania.

The following have been asked to serve as a National Advisory Committee: Orville Wright, Dayton, Ohio; Shadrack L. Cabot, president National Aeromarine Assoc.; Washington D. C.; Maj. Gen. Maxine H. Patrick, Chief of Air Service, U.S.A.; Adm. Wm. A. Moffet, Chief of Bureau of Aeronautics, U.S.N.; Col. Paul Henderson, Second Assistant Postmaster General in charge of Air Mail; Gen. Edward H. Smith, U.S.A.; Col. James E. Bond, Field Marshall; Col. Leslie H. G. Richardson, U.S.N., commander of NC-1 transoceanic flight; Glenn H. Curtiss, Garden City, L. I.; Russell S. Bradley, secretary National Aeromarine Chamber of Commerce, N.Y.C.; Dr. George Lewis, National Advisory Committee, Wright Aeroplane Co.; W. J. Price, Leavenworth Wright Aeroplane Corp.; Paul W. J. Price; Edward P. Warner, Massachusetts Institute of Technology; Cambridge, Mass.; Glenn L. Martin, Cleveland, Ohio; Maynard Ogle, Rochester, Aeronauts Engineers' Association; Chicago; Elmer A. Sperry, Sperry Gyroscope Co., Brooklyn; Wm. H. MacCracken, Jr., chairman, Legislative Committee, National Aeromarine Chamber of Commerce, Douglass, Governor for California, National Aeromarine Assoc.; Arthur J. Brock, Philadelphia; Howard F. White, member, National Aeromarine Association; Ralph W. Green, Governor for Iowa, National Aeromarine Association; and Gussie Davis, Governor for Nebraska, National Aeromarine Association.

Stability and Controllability of Airplanes

Part IV—The Elements of Lateral Stability

By B. V. KORVIN-KROUKOVSKY

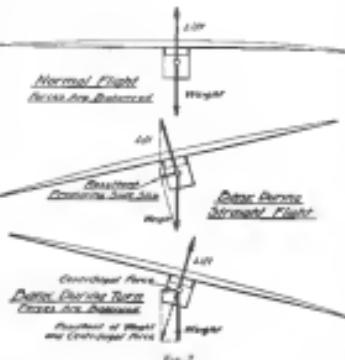
While continuous study and improvements were made in the longitudinal stability of airplanes, comparatively little attention was paid to lateral stability and controllability. It is probably due to the fact that the lateral forces are much smaller than those in the longitudinal direction. The Wright Brothers avoided the warping wing and conducted its action with the rudder. The apparent neglect of this question is explained by the fact that lateral stability and controllability have much less bearing on the safety of the airplane than does longitudinal, and that a more or less complicated and difficult task. Lateral stability consists in the action of the airplane in the plane of symmetry, and not so easily compensated with the wind tunnel. Lateral stability considers motion of the plane of symmetry itself, which involves three types of movement, yaw, and side slip, all of which are equally important and are closely interrelated in the lateral tunnel, but their mutual dependence and aggregate action can be determined only by flight tests. Very little flight test data is available in any branch of aerodynamics, and particularly little in the question of lateral stability. Yet we know that existing airplanes display wide differences in response to the lateral forces, and especially by the rudder, measured by writers in one case large and even negative, in another excellent controllability is obtained with seemingly small ones, and it is certainly interesting to analyze the problem and to find the explanation for these differences in airplane behavior. The lack of quantitative information about the lateral forces makes it difficult to make a quantitative and precise definition of what is meant by lateral stability. Yet we know that existing airplanes display wide differences in response to the lateral forces, and especially by the rudder, measured by writers in one case large and even negative, in another excellent controllability is obtained with seemingly small ones, and it is certainly interesting to analyze the problem and to find the explanation for these differences in airplane behavior. The lack of quantitative information about the lateral forces makes it difficult to make a quantitative and precise definition of what is meant by lateral stability. Yet we know that existing airplanes display wide differences in response to the lateral forces, and especially by the rudder, measured by writers in one case large and even negative, in another excellent controllability is obtained with seemingly small ones, and it is certainly interesting to analyze the problem and to find the explanation for these differences in airplane behavior. The lack of quantitative information about the lateral forces makes it difficult to make a quantitative and precise definition of what is meant by lateral stability. Yet we know that existing airplanes display wide differences in response to the lateral forces, and especially by the rudder, measured by writers in one case large and even negative, in another excellent controllability is obtained with seemingly small ones, and it is certainly interesting to analyze the problem and to find the explanation for these differences in airplane behavior.

Definitions

We define as lateral stability the ability of an airplane to maintain its position in the direction of the wind horizontal, and the tendency to return to this attitude after such disturbance. Lateral stability is a complex characteristic and depends essentially on the stability in roll and yaw, as well as on damping in each of these directions. We purposely avoid the use of the term "aerodynamic stability" in this connection, as this term is already used in the theory of aircraft, to denote the effect of the shape of the aircraft on stability. This article particularly is the effect of lateral stability on sideslip and rudder control. Such a quantitative knowledge will enable one to form a correct diagnosis of the behavior of an airplane, and consequently will enable him to find means for improving it.

gross of stability in roll and in yaw, degrees of damping in each of these directions and in side slip, and in the crossing of the neutral. All these characteristics have great influence on the performance and the controllability of the airplane, independently from their individual action. It is well known that rudder can be used to effect banks, while an airplane can be steered by the ailerons alone. In order to see this, let us consider the aggregate effect of lateral stability, it is necessary first to form a clear conception of the independent action of the lateral forces. These forces, however, are not easy to put in order, as we can show first the elements of lateral damping and control action, and then to show their individual action, first in the case of diagonal-cross demonstration model, and then in case of complete airplanes.

In the study of all elements, lateral stability is divided into stability in roll and stability in yaw, which to us are known, and we need any explanation, since they are very well known for motions with precisely the same - owing to Naval Architecture.



Stability in roll can be obtained by employment of dihedral, vertical fins located above the center of gravity, aerofoil and by proper distribution of the weight in the airplane. All of these devices except the last one are not used now. They are not used, since they do not prevent the roll of the machine, but only delay the onset of rotation about the roll. Fig. 1 shows a diagram of an airplane flying in normal flight, the lift of wings is located in the plane of symmetry and passes through the center of gravity. The lift of the wings is equal and correctly disposed. The wings are located in the longitudinal axis in longitudinal stability. When the airplane is banked to the left from the wings, the same passes with respect to the wings, i.e. it is now located by the angle of the bank. The force of gravity naturally remains constant. Two forces now are not directly opposed, and their resultant makes the machine side slip. The velocity of side slip which

penetrates to the velocity of forward movement produces the same effect as yaw in normal flight, it makes the radius wind circle the airplane more rapidly. In the study of the stability of the airplane the yaw is usually taken as an independent variable, and rolling, passing through the center of yaw angle of yaw are taken as indicators of stability or vice versa damping.

Let us now consider the effect of side slip or yaw on the wings of which are placed at an angle of incidence.

In straight flight the angle of lift, i.e. the angle between the chord of the wing and the horizontal, is at that time $\alpha + \delta$, where α is the angle of incidence of wings in air, at that time δ is the angle of sideslip as yaw is in side slipping, the air passes over the wings obliquely covering the distance b which is the width of wings. Vertical deflections h is to be considered as the sum of the angle of incidence and the angle of sideslip, and the angle of incidence of two wings are also different, because b is longer than b_1 and the angle δ is larger than δ_1 . The wing on the side of the lower nose, or the one which meets the air first has larger angle of incidence and has therefore a larger lift than the opposite one. This makes the airplane roll as a derivative of yaw, i.e. to the right, if the angle of sideslip is positive, or to the left if the angle is negative. The angle of sideslip will increase with increasing yaw, and side slip, and we say then that yaw always would be to the direction of opposite motion.

Such a discussion will show that wings with negative deflection make the airplane roll in the opposite direction, so we can say that yaw angle is negative. The angle of sideslip is deflected to a certain limit, but is such that the airplane will stop any sideways motion by it, i.e. roll side slip or roll on the turn. For those who have difficulty in visualizing it, let us consider the situation in which the airplane turns to the right. If we will compare it with deflection of an airplane in yaw, we will say then that arrow always would be to the direction of opposite motion.

Such a discussion will show that wings with negative deflection make the airplane roll in the opposite direction, so we can say that yaw angle is negative.

The angle of deflection is based on an increase of lift of one wing with increase of the angle of incidence, and corresponds to decrease of lift and angle of incidence on the other wing, and its effectiveness is directly proportional, therefore, to the slope of the lift coefficient curve plotted against angle of attack. Near the stalling angle the slope of the curve rapidly decreases (see Fig. 22), and so does the angle of deflection. As a result, the angle of sideslip and the deflection of the angle of incidence do not affect the lift, and the stability at roll therefore vanishes.

Fin Effect

First place located above the center of gravity of the airplane, this provides stability on roll because as the side slip develops, the fin is deflected to the direction of flight, which counteracts the effect of the angle of incidence, and corresponds to a decrease of lift and angle of incidence on the other wing, and its effectiveness is directly proportional, therefore, to the slope of the lift coefficient curve plotted against angle of attack. Near the stalling angle the slope of the curve rapidly decreases (see Fig. 22), and so does the angle of deflection which will immediately result in the generation of clockwise or destabilizing moments at the very result of the roll, without waiting for the side slip to develop. This effect can be readily understood by examination of Fig. 3.

Fig. 3. Consider for instance the action of the vertical fin when upright it leans up with a small angle and produces a moment.

When leaning up 90 degrees, the fin is in the same attitude as the angle of incidence equal to the deflection of the tail, and produces stabilizing (returning to original position) moments in the case of a yawed axis, and destabilizing ones in the case of a lowered one. For any probable leads the effect will be less pronounced but will have the same character.

In another way the wings act at the angle of deflection of the fin, the fin is deflected to the direction of the angle of incidence, and the advance over the airfoil is increased, so for the action only on the part of the airplane, based on the angle of incidence, and therefore moment effective area is zero.

The angle of the yaw gains as lift due both to increase of the angle of incidence and to increase of the lift coefficient due to change of the angle of sideslip. The wing on the side opposite to the yaw gains lift by the same amount. The effect of the crosswind on roll is, however, much weaker than the effect of a deflection of the same angle, but has no advantage, in that it does not diminish as rapidly at low speed. The effect of crosswind in case of both of the deflected at high speed, but becomes short one third of it at starting angle.

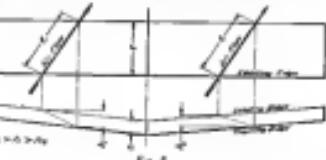


Fig. 5

It must be strongly emphasized that dihedral, aerofoil and vertical fin contribute to side slip or yaw, and are absolutely indifferent to the position of the airplane with respect to the horizon. If the airplane is side slipping due to banks in straight flight, the action of the above mentioned stabilizing means will make it roll in the opposite direction until the bank is corrected. If on the other hand, during straight flight the airplane is yawed, the aerofoil and vertical fin will correct the sideslip, and will cause it to bank to correct the yaw during any turn, the stability in roll will prevent the airplane from either side slipping or shaking.

In the same discussion we assumed that an airplane rolls along an axis parallel to the direction of flight, which actually represents the true roll toward turn, where the main problem and most difficult is the roll of an aircraft. A body like an airplane in flight will not rotate about an arbitrary axis, but approximately about the axis of least moment of inertia, the position of which can hardly quantity estimated by considering the most important masses. If this axis is not parallel to the wind, the reaction will not change the angle of sideslip, but the angle of attack will change, and the angle of incidence will change, too. This will immediately result in the generation of clockwise or destabilizing moments at the very result of the roll, without waiting for the side slip to develop. This effect can be readily understood by examination of Fig. 3.

Fig. 3. Consider for instance the action of the vertical fin when upright it leans up with a small angle and produces a moment. When leaning up 90 degrees, the fin is in the same attitude as the angle of incidence equal to the deflection of the tail, and produces stabilizing (returning to original position) moments in the case of a yawed axis, and destabilizing ones in the case of a lowered one. For any probable leads the effect will be less pronounced but will have the same character. In another way the wings act at the angle of deflection of the fin, the fin is deflected to the direction of the angle of incidence, and the advance over the airfoil is increased, so for the action only on the part of the airplane, based on the angle of incidence, and therefore moment effective area is zero.

The angle of the wings also produces stability in roll because of the effect of the angle of passing over the wing as on the case of this fin. In other words, the angle of deflection of the wings is constant and the moment caused is in one direction. The result of this is that the angle of incidence of the lower wing becomes shorter than on the other one. This produces a double effect—it makes the angle of incidence on one wing larger than on the other, and changes the longitudinal wing section, as the section of the same thickness is stretched, or to speak, to a longer chord. The wing with higher ratio of thickness to chord are known to give better lift than ones of lower ratios, hence the wing on

(To be continued)

The R-33 Emulates the Shenandoah

The Reconditioned British Airship R-33 Is Blown from her Mast and Returns Safely to Her Hangar

The R-33 was put to storage shortly after the accident to the R-38 (23-31) and when the Air Ministry decided to build the 50,000th R-300 on 21. II. 1908 and R-33, they ordered her reconditioned in order to serve as an experimental and training ship. She had made several flights down flights and was assigned to the coast of Africa when she suddenly had storms.

A gust of 50 m./hr., when blowing all night and the windship had been blown nearly to the west to which it was moored. Nevertheless a crew of twenty under Lieut. W. N. Booth, Brit officer, was already preparing for an experimental descent. Suddenly at 9.50 a.m. there came a fierce gust from the west and the windship took a drift. An arm of the mast had snapped, but the damage from the new storm to

the windship's nose was badly set.

Out of Control

At first it was evident the R-33 was out of control. She was swinging broadside to the wind, rapidly lancing from side to side and being dashed at a great pace through the air. It was some time before she found an even keel, then her nose began to upward, then her tail. She lay at the start of the windship's arm, but quickly she was forced to see her actual drift as the drifts over the flat country toward Puffins and the sea.

Extreme exertion was caused at Lowenhoft as she drifted over the town, about half an hour after she broke loose. Hundreds of people rushed into the streets and watched spell-bound. A few gallant attempts at several attempts appeared to be made to sweep her around from the land. These failed and the R-33 was carried over the sea.

Every one felt that she would settle on the water and be overwhelmed by high seas. Preparations were hasty and proved to cover the case of necessity. H. M. S. Godet, a gunboat, a fishery boat, and the motor launch Agnes Cross stood by to open fire.

For a time it seemed scarcely possible the saving could succeed, but suddenly the operators saw her nose sharply to the air as if the arm at last had gained control. Once, twice, again her whale became to quiver and there were ominous tips in her course. She dropped a white light, the signal of distress, but in a quarter of an hour after she was first sighted at Lowenhoft the windship had under control and flew upward flying steadily.

Radio Contact

At 12 o'clock she sent a reassuring message by wireless and a little later was off Yarmouth. From that time on the R-33 was in constant communication with Puffins and was able to exchange news with all meteorological information at the command of the Air Ministry.

The windship was blown from the northeast and orders were given the windship to steer straight into it. The wind moderated in the afternoon to 25 m./hr. but she was turned eastward off Holland.

At 3.30 she was 60 to 70 m. northeast of Lowenhoft and an hour later about the same distance from the British coast. At 4.30 p.m. she reported having come near Timmendorf and was apparently trying to fight her way back.

Though by evening it was hoped in all likelihood the worst was over and the R-33 would succeed in making her way back to her base at either Puffins or Coggeshall, no effort was spared to meet any emergency. The lifeboat from Lowenhoft had turned back after the windship got out of sight in the mist, but the Coggeshall lifeboat had gone to the rescue across the North Sea ready to draw her to safety along the coast. The Dutch authorities had been reconditioned and sent a fleet of small craft to watch for the R-33, and in various centers such as Rotterdam, where a landing might be made, crews were

constantly prepared to catch any ropes the windship threw out.

About 7 o'clock, however, a calamity was noted by the report that the long fight against the elements was ending in disaster and the R-33 was calling for immediate assistance. Her nose, tore badly when she broke loose, was still, but twisted under the strain, allowing her engine to the south and she was making only 50 m. per minute. The master, however, was still doing his best. It was then that he received word of a passing Japanese ship, the Amakaze. He had sighted the R-33 unexpectedly in the night. He told make out her how was damaged and said she was flying slowly and thought the ship in serious distress. She will end up even at once and as her messages were packed up when it started spread.



Official Photo U. S. Navy
The R-33 at her morning moor

About an hour later 8.30 o'clock, the windship reported she was definitely returning to Puffins. She was then ten miles east of Yarmouth and would soon directly toward home. She was still not able to make the turn and commented: "I am attempting to return." Shortly before she crossed the Dutch coast she reported her engines working O.K.

At 9.30 o'clock came another message announcing she was making from E to 100 knots and steering 263 deg.—that is about west-northwest. At 10.30 she was heard shouting We have many survivors here and are looking for help. She had no intention of heading home, but the windship had lost control, making way slowly home. Great relief was felt at official quarters at the news and it was believed the wind-

ship was safe, though the windship could not make Puffins before dark.

The Godet, which is standing by during the night to accompany the windship over the North Sea, received the following wireless from the commander of the R-33 at 11.30 p.m.: "My ship is now flying from Yarmouth, but I am unable to make out where she is going." At 11.30 hr. it asked for a forecast of the weather, stating the wind was back to west by north, 25 to 35 m./hr. It is a strong east at 11.30 p.m. as the R-33 reported she was making about thirteen knots. She is known to be holding a west-southwest course across the North Sea toward Puffins, where, unfortunately, preparations were being made to house her on arrival.

Homebound

The R-33 had proceeded at 3.30 o'clock to Puffins that she was 50 to fifteen knots toward Lowenhoft and at 4.30 o'clock started the ship Godet to close in on her.

The most recent record by the Air Ministry at 5 in the morning was the R-33 was 80 m. west of Amsterdam, making steady progress afterward at about eight knots. The windship was still flying by day.

A wireless comes to the Air Ministry from the windship at 6.30 a.m. as it said she was 50 m. west by south of Amsterdam, and at 7.30 a.m. her later tele she reported that she was flying toward the British coast at a speed of between eight and ten m.p.h.

It was estimated that she was then approximately 50 m. from the Puffins Flotilla.

At 8.30 a.m. the ship was making her nose knock against a 20 m. wave. During the night, the dirigible commander, Capt. F. N. Godet, considered setting for a tow of the adrift windship persisted. He wired back at 11 a.m. that she was making twelve and one-half knots, 95 m. to the west of Holland.

The R-33 passed over Lowestoft at 1.00 p.m. while clouds, gathered along the promenade, showed ominously.

The patrol boat Godet, which secured the ship on her return flight from Holland, exclaimed: "You have made a splendid fight."

Overhead, her name apparently was crooned in, for the ship was making good time. The windship was safe and the crew was in good form.

"All right! We're as happy as skyarks," came the answer. At 2.15 p.m. she was over her harbor at Puffins having answered preliminarily to getting her into the place of refuge.

She was safely moored in her harbor on her return from the long erratic flight shortly before 3.30 o'clock.

Engines Nursed

The commander of the R-33 did not operate her fire engines immediately, but used them in relation to sustain his speed married out. The fuel supply was sufficient to enable the windship to make the field at Puffins.

Captain Fellowes, who made the passage on the R-33 from Godet to the R-33, has proposed other operations that the windship may well be able to make, but the design of the flying boat, but to determine of the metal of the missing arm during the five years it has been in place.

The gale that drove the R-33 across the North Sea was one of the severest experienced by the British Isles in recent years and did much damage. In addition, there was felt on northern England and southeastern Scotland, where the wind reached velocities in some places of 60 and 90 m./hr., accompanied by snow, hail, thunder and lightning.

Signs of destruction came from all parts of the country, with reports of scattered fatalities and injuries from falling buildings and similar occurrences.

Widespread damage was reported along all the coasts. The shipping services to France, Holland and Belgium were completely discontinued and the air services suspended.

At the height of the gale an alarming earth tremor was felt in Cheshireshire, it being the third in that district within a year. The shock was accompanied by a thunderous roar and associated with an intensely black sky, from which fell tons of earth.

April 25, 1905

AVIATION

Algasoren Polar Expedition

Geoffrey Algarn, the young British Columbia, who happens to be Capt. Bodo Anderson, the Norwegian explorer, in the air race to the North Pole, using a small sailing vessel in the blimp type, left Falmouth April 12 in his little exploration aircraft for Liverpool, where the ship Ireland will be finally loaded with stores.

"Our expedition is a sporting and sounding one, and is purely a British show, with the main idea to beat America to the Pole and win the British Rag Show," says Algarn.

Algarn's principal assistant will be Capt. Frank Arthur Worcester, who was the Ernest Shackleton's sailing master on the last British Antarctic expedition to the Queen Maud Land, but who were massacred on Elephant Island in the Arctic winter. It was Worcester who, when the ship was lost, got ashore and built a small open boat only partly covered with canvas, more than 300 m. through the gales and grinding ice banks in the coast of the Island of South Georgia, where he obtained food for the survivors.

Flight Lieut. Alan Percy Hampshire will pilot the windship in the dash for the Pole.

Another veteran polar explorer abroad will be W. J. Marr, the "Boat Man" of Shackleton's last expedition. Young Marr has been graduated early from Aberdeen University in order to become an Algasoren, an assistant biologist, representing Liverpool University. Marr, with only other two members of the chosen team thousands of British Sea Scouts who Shackleton made his appeal for two and a half years ago, the organization. He was highly praised for his work as a biologist and entomologist at the Shackleton expedition.

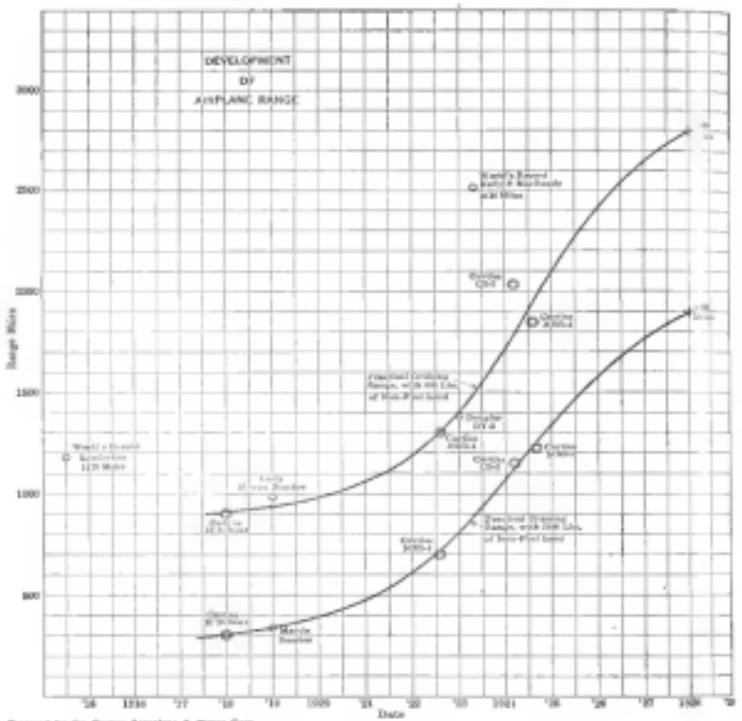
The Ireland will carry a crew of eighteen men, although Algarn and Worcester will be the only two to go to the Pole. The ship will carry a crew of eighteen men, although Algarn and Worcester will be the only two to go to the Pole. The present plan calls for a halt to the west coast of Spitzbergen. Then the ship will be pushed as far as possible into the polar ice fields before a base is established and the long start for the Pole.

Applied Aerodynamics



Fig. 2. R. R.
An aerodynamic windmill designed by Major Barlow and erected at Oxford Institute of Agricultural Engineering, Harpenden, England

A Prediction of Airplane Range



Prepared by the Bureau Acceptance & Motor Corp.

Sparking Voltage of Spark Plugs

NACA Report No. 262

This report has been prepared by Francis R. Shibley in order to collect and correlate data convenient and useful to the aviation on this subject. The importance of the subject is that the data which form the basis of this report will be of value in the development of spark plug research for studies on the performance of spark generators and spark plugs on the one hand and of the internal-combustion engine on the other hand. While much of the data presented was obtained from various earlier publications, numerous places were found where necessary data was lacking.

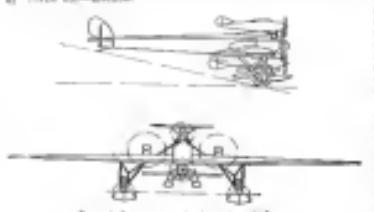
and these have been presented by experiments in gasoline engines at the Bureau of Standards.

The principal variables which affect the sparking voltage are the length of the spark gap, shape of the electrodes, gas density, electrode temperature, mixture ratio and pressure. The report also contains a brief discussion of the time lag effects on spark gaps, which is particularly important in the case of the standard gaps used in testing ignition apparatus. Report No. 262 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

A Scheme of Aerial Bombardment

By R. F. HALL

The following discussion of the use of glider aircraft in aerial bombardment is of great theoretical interest. Following as it does, the article on the use of aircraft in flying boats developed in the development of aircraft at present, it is of interest to those who are interested in the use of aircraft in aerial bombardment. The author is not in a position to bring out the main thought and should like to take you briefly. We would be interested in receiving further material along these lines. The target glider aircraft is by the Army Air Service a modification of that used in our war. This glider was illustrated on page 225 of the issue of March 1918.—Editor.



Suggested arrangement of carrier airplane

It would seem, to the casual observer at least, that in the present battle of aerial bombardment, the potentialities of strength have hardly been given due importance. The science of aerial engineering is well enough developed so that part of the art of bombardment may be known. At present, however, the science has yet to reach a stage where it can be positively stated that even the principles of flight for the slow aircraft have been determined. If there is, as at the present time when the science of aerodynamics is in its infancy, a question as to the comparative military value of aircraft and balloons, let me say there is a question which can yet ultimately prove important.

During the last war it was planned that the Germans were developing a type of bombing aircraft which would greatly modify the existing system of aircraft bombardments, and probably obviate the dirigible airship. This scheme, although it did not materialize, was apparently a good one. The addition to flying warships of a small detachable portion, to fly in warships, at first time, large transports or mother airplanes was intended to cover a small detachable airplane that could be released in flight for auxiliary purposes, and mainly for defense against hostile aircraft. It seems strange that since the war experiments have not been conducted along this line more widely of this arrangement, probably because of other particular advantages in the field of aerial combat, namely, the ability of the flying母机 to land directly from long distance transports.

That type of detachable craft may be referred to as auxiliary weight or a unit of parasite is quite likely, but as a matter of fact this is not necessarily the case. What proportion of the母机 craft for whom should probably be more than can be carried by the母机, would simply depend upon the size of the母机, the size of the auxiliary weight, the size of the母机 ship and whether the auxiliary weight is a necessary element of the母机. The power plant of the detachable craft would be a power unit of the large母机, centrally controlled and functioning without any loss in efficiency by reason of necessary variable pitch propellers to compensate for the difference in speed when attached and detached.

This does not mean, however, that in organization, to posture a formation of such bombardment airplanes, the母机 attack by hostile airplanes, the release of the defensive elements and the ensuing battle. After a repulse of the enemy one may

further imagine the remaining elements returning to their mother craft. Such a maneuver is entirely within the realm of possibility. Recent experiments by the Army Air Service demonstrate that airplanes can be released from an aircraft in flight. An excellent proof of this is the following. The formation is flying at high altitude and the objective is reached. Let us assume this to be a fleet of enemy warships. What happens now? Other elements carrying large bombs or perhaps the same defensive elements fast with bombs taken on the母机 stop flying the latter part of the flight, according to the母机's own plan. The speed of the母机 against anti-aircraft gunfire drops down again the surface ships and from her altitude drops their explosives with precision and accuracy and make off, possibly to return to the mother plane or to a predetermined location where, alighting on the water, the planes either replace their fuel tanks or take others from friendly carriers or supply ships. The母机 aircraft's aircraft could then be stored aboard or destroyed.

From the engineering angle such a scheme does present difficult problems but the obstacles are far from insurmountable. The detachable bombing elements could be designed to weigh under 3,000 lbs and carrying a load of 4,000 lbs, passing through the air at 100 m.p.h. It is true that the母机 would be limited, for example, say 120 to 150 m.p.h., but when the bomb is released this would be greatly improved and the performance is up with present ships. The strength of the母机's own bonds would be more than double. However, the flight endurance would be rather limited but while operating as a unit of the母机 craft the fuel supply could be maintained at maximum capacity for the sake of detached flight. If a reconnaissance of the母机 and detachable plane should not be feasible the detached craft could be launched in flight from the fuel supply of the母机 ship at regular intervals.

There are other advantages offered by this scheme of bombardment. The母机 can drop the母机 on the ground to protect the母机 or the detachable plane, go up again without the fatigue or strain of a previous long flight or such planes might even be controlled by radio. The auxiliary or detachable units may be of the pursuit or reconnaissance class and employed on missions on elements of the母机 craft which are not able to carry the母机 or母机 ship without these elements, thereby providing increased coordination and economy a reduction of service equipment.

The accompanying sketch illustrates an arrangement of a母机 airplane with detachable craft and together with this unit may serve the useful purpose of creating a diversion



Diversionary Mission Photo
H.M.S. Ark Royal launching a seaplane from her catapult during a diversionary mission.

AIRPORTS AND AIRWAYS

Covington, Ky.

By E. P. Mack

The new Covington Field opened Sunday, March 28, with about 20,000 people present. It was a new day and due to the heavy up North, stops from Kansas and Dayton did not appear.

Few of the widely advertised speakers of high places around Covington were in evidence but G. E. Lay and General Kethen made up for it all. Mr. Lay in introducing General Kethen made one of the finest sales talkers in commercial aviation we have ever heard. He said: "Men of Missouri, Connecticut and Kentucky, you do not just buy an airplane; you build one." The speaker was a pilot for pleasure. General Kethen told what he was trying to do for Kentucky's military air service and promised that Covington should share. Both speakers avoided the word "promotion" and got right down to facts. The Tank Corps from Covington entertained the crowd with tea, serving states, also serving a hot hot dinner and treat in Kentucky style.

The field, which has just been completed, is said to be one of the finest nests of the Ohio River, and is located on the north side of Battleground pike, near the State highway, five miles south of Covington.

It includes a tract of some three 200 acres, which formerly was the Schlesinger farm and has been leased for a period of years by the Covington Field Corporation. W. E. Johnson, Jr., of Cincinnati, who had charge of the property.

Three runways have been installed, within a clearance of 1,500 ft. which is the width of the field. Hangars to accommodate the three large planes, which are to be kept at the field for commercial purposes, are to be built.

Boston, Mass. By Postal Adams

The Boston planes recently announced that a local national company was interested in the establishment of an air tax service in addition to its regular business. Judging from considerable experience in Boston towards the trip to the Airport will be considerably more thrilling than anything which may take place there.

There is a meeting of the Municipal Air Board of the City of Boston at the City Hall on Tuesday, April 14, for the purpose of discussing the erection of a commercial hangar at the Boston Airport. This matter has been under discussion for some time and it is hoped to erect a public hangar between now and early summer.

The congressional delegation of the State of Maine, (Augustine Chapman, of State, A. J. Abbott) were held in conference on the evening of April 9 at the Augusta House. Gen. Francis H. Farnsworth was elected president of the Chapter. Ralph G. Wiley was elected secretary and Governor Brewster of Maine was elected an honorary member of the chapter. Hon. William H. Grayson, the governor of the Association for the state of Maine gave a dinner following the business meeting to all members of the chapter. Several speeches were made including one by Congressman Nathan of Maine. The chapter now has fifty-three members and is a constantly growing.

Among the guests at the dinner given by William H. Garrison at Augusta were several representatives aviation enthusiasts from Portland who reported that plans are well under way for the establishment of a chapter of the N.A.A. there. It is expected that the necessary incorporation cards will be sent to headquarters within a few days.

The local flying record of the year was made last week in Boston by ninety-one flights of the Army, Navy and National Guard which had a total flying time of 77 hr. Its was 27 hr. 38 min. of which was done by the Navy and the Army 35 hr. 38 min. The National Guard accounted for the other 15 hr. 23 min. The most extended cross country trip was made by

Lieutenant Doolittle who made a flight with a passenger to Portland, across New Hampshire over part of Vermont and returned to Boston. His flying time on this trip was 22 hr. 20 min. The Army and the Navy had record car trips, never before during the past week, the Army clearing out Boston. A. E. O'Keeffe, who has recently returned from Texas where he completed ground and flying courses at Brooks and Kelly Field. The Naval pilot was Lieutenant J. B. Lynch of the Naval Reserve Force. Much of the foregoing has been frankly copied except that excellent column which appeared weekly in the Boston Transcript, written by "Dan" Brookfield of the Transcript staff, and one of aviation's finest friends in government, and is rendering great service by making the general public more familiar with the activities of their sport.

San Francisco, Calif.

The Chamber of Commerce, run by Walter T. Varney, reports that they are quite successful. The first regular flight was made by French Charles of the San Francisco Flying Service on April 10, 1928, from San Francisco to Glendale, Calif. He telephoned for a cab at 38-45 St. and the passengers at 12-63 St. was at Modesto. He was back in his office at 3-82 p. m. in time to write his story. His description of the flight was printed on the front page of the Daily News the next day, April 7. The planes used in this service are New Standard, distributed by Walter T. Varney.

Wichita, Kan.

Wichita is to have a new flying field on the near future due to the Travel Air Company's lease of an eighty acre field just outside East of town. This field is on a paved road. It is the first paved road in the city and is to be used by the company. These bi-ports are being constructed and service for visiting pilots will be available as soon as the facilities can be installed. There is a thirty minute bus service to town at the field.

Detroit, Mich.

The first flight of the new Ford aero is made April 25 from Detroit to Chicago, inaugurating a bi-weekly service between these centers. The plane carried 382 lb. of small automobile parts, 167 lb. of 50 lb. and 138 lb. of printed matter and was driven by Edward G. Hanna. The plane was the first of the Polaris series and started the transcontiental post road with a crew of two and cost for 850 mi. The route from coast over was from Detroit to Bryan, Ohio, and then west the Air Mail Aerway to Chicago, a total of 285 mi.

This series is a private venture of the Ford and will be used to connect up the various Ford plants with the main offices at Dearborn. The flight will consist of eight stops and will cover a total distance of 2,000 mi. In connection with this service it is reported that Randolph W. Belcher, the famous famous test pilot at McCook Field, will be in charge of flight operations for the Fords. Since leaving the service Major Belcher has been in charge of the aviation interests of the Goodyear Laboratories.

An account of the first flights can be deferred they will be given later and it is reported that air mail will be introduced to coincide the Ford plane at St. Louis, St. Paul and the Rocky Mountain. The Fords already have a private radio net covering their properties in the middle west.

Air Mail Valued

Through the use of the air mail service, a firm at Newark, N.J., manufacturers of water heaters, secured the largest order contract on record with a northwestern city. The sale was made public in a letter received from Postmaster Frank A. Book of Newark by Postmaster General Newell.

April 27, 1928

The City of Portland, Ore., opened bids recently for water meters. The bids were opened March 18 and the main office of the Newark firm did not receive specifications and proposal blanks until March 23, so that there was not sufficient time to forward the necessary papers to Portland by regular mail route. The firm, therefore, telegraphed the city and arranged to receive a wire from their representative. The wire the day before bids were to be opened stating the papers had been received in perfect condition. Incidentally, the air mail service was responsible for the Newark firm receiving the contract for 26,000 water meters from the City of Portland.

In a report made public by Second Assistant Postmaster General Fred Henderson, F. A. O'Leary, manager of the air mail station at Reno, Nev., sends on this bit of interesting information:

Arriving for work on March 20, shortly before 7:30 a. m., we noticed a stranger waiting for us on our platform porch of the office. Immediately he was identified as a fast mail from Los Angeles. He left for Los Angeles by plane yesterday afternoon with an important letter which had to be in Chicago by Saturday noon. Flying in Sacramento yesterday evening drove by train to Reno in time to catch this morning's regular eastbound plane solved the question for him. Of course, this is an unusual occurrence but it demonstrates the public's faith and reliance in the Air Mail."

Zepplin to Move

The Zeppelin company has requested the Swiss Government's permission to transfer its factory, with personnel and machinery, from Friedrichshafen to the Swiss island of Lake Constance, either at the Center of St. Gall or the Center of Thurgau.

The company, confident of a favorable reply, already has sent agents to Rorschach and Birsfelden to examine suitable sites. The company intends to construct commercial dirigibles capable of flying safely across continents and oceans.

It appears that the Allies have refused the American and German demands not to dismantle the Friedrichshafen works

Main Pilot's Nerve

"Always be sure you have your belt on before you take off with a Western hero."

This is the advice given by our mail pilot Wiley after two furloughs and thousands furlough landings, one from a plane and the other from a horse, while carrying the United States across the Alps.

The dapper, trimly dressed Wiley and his two surcrafers escape from cold death or drowning to safety by horseback were publicized by Postmaster General Newell.

Here is the way Wiley tells the story:

"I was crossing the Alps Mountain at about 10,000 ft. when I broke a set of gears and landed in a very small field at Stettin Pass. A small landing was made with difficulty owing to the mud and stones and rocks all around. The horses were loose and I had to ride over and over and my men had to ride to the nearest ranch house 5 or 10 mi. away. After plowing in like a horse for help I started back to the ship as the horses. I mounted, or started to mount, and as all true western horses do, this one took off in a climbing turn before I had got in the seat and had my safety belt fastened.

"I had to make a long stay at the ranch because the horses had to be loaded and we had to wait for the road to open again. After riding the air with smoke for a few minutes, which, by the way, must have scared the horses, I managed to catch him. This time I was prepared and we took off as fast as the horses could go. We had to fly out fast and the motor was repaired and I flew the ship to Stettin.

"I had the ankle set that night by one of the best doctors in town. I had the good luck to know a pair of crutches made for a man six feet tall, and as I am five feet seven we got along fine. I had the bags at the field pack a string on the right leather bag so I could pull as well as push. This made up for the loss of my left foot."

"I took off for the city of Salt Lake with the regular mail as usual, as there was no other pilot available."



The See-up of the New Standard of the San Francisco Chamber Air Service

The Father of the Air Mail Speaks

Robert A. Mitchell

The confidence over the aviation branch of the military and naval services is well deserved, according to Robert A. Mitchell, Major General Mitchell, from his important post as Adjutant Chief of the Air Service, to the American people. That surely is the opinion of General Mitchell, or the opinions of a Sergeant Air Service or a United Air Service. Freed of personalism and mediocrities, the commanding general of the Air Service, in the words of the commanding chief, will consider the number of voluntary aviators upon the merits and without regard to the effect upon the morale of the battalions on the coast defense.

There can be no quarrel with the Army and the Navy over caution in developing their programs or shaping their weapons, but the people have a just quarrel when those same agencies, in their desire to develop the military and naval development, are instrumental in national defense, because the results may affect the importance or the very existence of some element in the war organization. The speediness of a large part of the public for General Mitchell in his bold flight is not a national shame to him, but a credit to the Army and the defense of America. It is demanded that every aviation program be developed to the end that the battlefield may become more favorable, if possible, and that the value of the coast defense be enhanced by the fullest development of this powerful factor in warfare. That is the interest which this nation has in this aviation development.

Those who followed the bombing demonstrations which Mitchell staged on the battalions Virginia and New Jersey, on the German warships and on land targets, and who are convinced with the conditions under which some of these demonstrations were staged, believe the testimony of their leaders, notwithstanding any theories in the currency. That is the point in hand, the doctrine and the meaning of the results of these demonstrations.

The attitude toward military aviation taken by a formidable element in the military establishment holds out small hope that either the Army or the Navy will develop an effective aviation program, and that is why there is such a far reaching difference in the methods of the two services in the national defense in the hands of a separate branch of the government which should have vision and faith, and which should be untroubled by fear of consequences to some other cherished branch or institution of the service.

The demand that there be no destruction of our war machine is the demand of the nation, of the people, of the responsible one. For that, the people will agitate as long as there exists some form of national defense, and they will do it to the gallant fight which General Mitchell has made but has been made in vain.

Otto Franks

UNITED STATES AIR FORCES

U. S. ARMY AIR SERVICE

San Antonio Maneuvers

The final phase of training for the class at the Advanced Flying School which just graduated was a maneuver of the numbered branches of aviation at Kelly Field and not only were the Air Forces of Attack, Reconnaissance, Observation and Pursuit used in their normal wartime functions, but individually and in conjunction with each other, live exercises were made all the more realistic by the earnest cooperation in the maneuvers of the Red Division, including Infantry and Artillery Brigades, stationed at Fort Bliss, Houston. This was not only the first maneuver on a large scale held at Kelly Field involving the four branches of aviation, but it was the first time that the various branches had been so cooperatively with large bodies of ground troops stationed in the same area. The results obtained and the enthusiasm created on all sides were beyond the most sanguine expectations of the Red Division. The training progress of two brigades of the 2d Division were materially accelerated in order to cooperate with the air maneuvers of the Advanced Flying School, and the Division Commander, Brig. Gen. Preston Powers, as well as the Commanders of the numbered branches and the commanders of all grades, earned a general salvo in the Air Service which has never been shown by officers of the older branches.

The general situation arose when the maneuver was based upon a war between the Blue Army, defending San Antonio, and three Red Armies, attacking from the north and south. It was assumed that the existence of an Army Air Service would be represented by the existence of an Attack and Pursuit Aviation, one group of staff, and Observation Aviation. The First Army, First Air Corps and a group of Bombardment attacked from the General Headquarters Reserve. The First Army Observation Group also performed the function of Battalion Air Service. The students of the four departments of the Advanced Flying School were assigned to Group and Squadron Staff Officers, Air Army Air Service Operations and Intelligence Office with a group of their own personnel, received instructions obtained from actual observers, and spent the greater part of the initial Field Period of the Army Air Service Commander, the maneuvers themselves, which lasted day and night for three days. The students made extensive use of the situation, wrote formal field orders, and carried out the maneuver.

In general, the maneuvers were a great success from an instructional and tactical point of view. There were some activities which deserved special mention. Capt. L. L. Harvey, while leading a Red Army Attack force, again demonstrated his remarkable ability in aerial tactics upon a steeply rising slope and the bombs which were released at about 200 ft altitude, reached the ground not over 150 ft. below the ships. One result was 17 holes through the ships of the flotilla, fragments passing very close to the crew, one shell exploding a Liberty engine partially hatched off, and a wild scramble to get out of the way. This was well planned and much was learned. The students in Attack Aviation also made a night raid on Austin, 85 mi. from Kelly Field, and returned safely.

The new No. 135 radio set, installed in a Martin B-10, kept in constant voice communication with Kelly Field as far as Austin and back, a distance of 85 mi. It received ultrahigh messages up to about 17 mi. The Division Staff Officers were continually interested in the radio and the possibilities that it offers in the tactical employment of ground troops.

Another very interesting feature was the use of paratroopers for night reconnaissance. Three of these have been dropped from as altitude of 2000 ft over an Infantry Brigade

deployed. Although the ground troops were able to cover themselves from aerial observation during the bunting of their shave, it was impossible for any considerable body of them to move without being seen.

Numberless Airshows Contred

By Tech. Sgt. M. L. Haas

With returnance on March 3 to Selfridge Field with the loss of the men and supplies from Ossawa, survivors of the First Pursuit Group, Capt. Henry Pausch, A.M., of Wm. D. Wright Field, piloting a Martin Bomber, many parts of interest were sent and about 1400 lb of freight, was formed enroute east to Evansville, Mich., due to the failure of the motor solenoid.

Earlier that morning Captain Pausch had taken off from Selfridge in the face of a strong wind from the South and North, and had been in the clouds without visibility in 10 to 30 sec. Landing at Ossawa, the ship was found completely loaded with freight. One of the exhausted men was sent to the front cockpit and one on the rear, Corporal Egleton, of the 5th Service Squadrone, acting as mechanic. The take-off was made into a 30 to 40 mi. wind still blowing from the south and southwest.

"I am not sure of the 'why' and 'what' Captain Pausch is referring to this trip," I commented in disbelief as he told me of the trip. "It seemed rough and grainy that I at once decided to try to chance an crossing Saginaw Bay between Tawas Point and Fish Point, a distance of some 90 mi. when, due to the very nature of several Adjacent Compensation Seats Claims and a survey on one perfectly good location and some 2600 ft. of Government property. Close to the shore the sea was sufficiently turbulent to make me apprehensive, so I followed the Western shore of the Bay to the lower end where I crossed and turned the nose of the ship directly to the land toward home."

"All of that time I was forced to fight sudden gusts of wind which kept closing down one wing and then the other. The ship for all its size and load was leaning about like a keg. The Master Corporal, himself, was myself could see the two wings of the ship in the distance, glancing I caught sight of the nose in the front cockpit. I judged that we would

"The ground a few miles north of Selfridge Field to Saginaw Bay is very rough and, due to the locations of the two fields sufficiently level for landing, a forced landing might easily result in serious accident. I think I must have thought of that in a sort of calculation, for we were twice down, though it was very difficult to measure those times."

"Just South of the Bay, about five miles, we hit some extremely rough spots, three or rapid successive, rock following immediately upon the other. I must have had about 1200 ft. altitude at the time when I sensed those, felt the ship slip to the side and observed one wing down at about an angle of 45 deg. I thought nothing of this, however, and immediately gave the ship a turn to bring the wing up. The turn of the ship brought the nose down again, and the wing down again, and I was still slipping. I grasped the wheel harder and gave it another turn, but nothing happened to check my increasing descent. Something was radically wrong. I cast the wheel a spin and set there for an indication part of a second while it revolved crazily beneath my hands. 'What there is outside there is hope,' according to an Air Service maxim. I firmly locked myself rigidly to the rod. Then by casting the engine on the ground and throttling the engine on the top edge I managed at last to level the ship. An act sort of a crash saved me from crashing the nose of the ship. I made a sign to Corporal Herold to get the man out of the front

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AIR AVIATION

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"Corporal Herold did his work well, for I soon noticed the sick man was seated on Herold's lap. The wind was forcing us to go east. Ourselves first one meter and then the other to keep level, and I knew I had to take action.

"We were just north of a little village we later found to be Escanaba, Mich., and over land that appeared to be an area to have lots of small hills and gullies dotted with sand and stone ridges. I was fast losing altitude for the ship had been flying at an altitude of 1000 ft. and was up to meet to three thousand feet, about 1500 ft. high. Each load was freed, and on the northern end were seven boxes which would force me to put the ship onto an even keel if I was to get her down just past the first fence. I couldn't possibly stop in a safe field, but I knew that with the heavy load and the wind blowing the ship down at such a rate, the landing would be disastrous. I was stronger than they appeared. I was a busy pilot before figuring distance to a mathematical certainty and in guess at and therefore the two engines in order to keep the ship up. I should have had more than two hours. 8:45 AM. I could not find a suitable place. Corporal Herold, after much trouble with the seat belt, took charge of the ship and applied my pretzel. Directing my attention to the engine at 8:45 I got my pretzel and managed to get the ship down past the first fence. As I had plenty of speed and the ground was very level, the ship rolled along, rolling through the fence and down into a field. The ship stopped and stopped and stood and did not do any of the usual. According to the sound of the engines, the almost absolute quietness was striking, and I knew suddenly resolved into another world.

Unrolling my belt and removing my pretzel I began an painstaking inspection to locate the cause of the trouble and found that the four small pins holding the pretzel to the main control bar had sheared easily, leaving the wheel to the left loose. I took the pretzel off and applied my pretzel again. Further investigation showed that the pretzel had not been applied to the pretzel but that the fence through which had had applied had caused little damage, a few nips in the fathoms and a broke wire here being the sum total.

Corporal Herold got the man out of the plane and we walked to a nearby farm house, around the door of which stood the occupants evidently wondering what sort of things had suddenly dropped from the upper air. The farmer was very kind and placed his house at our disposal. I immediately got in touch with the Selfridge Field and was told that a B-10B would soon necessarily accompany the necessary repairs and an additional machine. The ship arrived that afternoon and the next day I finished the flight to Bellingshaw none the worse for wear and everyone safe and sound. And that's it."

Fairchild Depth

The Major Steps at the Fairchild Air Intermediate Depot, under the direction of Capt. Edward Langford, completed the following week during the month of January. Airplanes 3 241411, 1 Pecker CG-4, 6 JN5, 6 MSA, DB10A, 1 BH-1, 1 NHD-1; Engines 23-Liberty 122, 30 Wright H-2. The following week the following were completed: 2 DH4B and 1 ME5 biplanes and 16 Liberty USA engines.

In addition to the above, the following work was accomplished at the Fairchild Assembly Department on existing aircrafts. Installed new noses on Selfridge Field DH4B, installed new under and back roofs in Fort Riley DH4B, reengined new Night Flying Wings on Fort Riley DH4B; reengined Selfridge Field Airplane plane.

U. S. NAVAL AVIATION

Pacific Flight

A nonstop flight by Naval seaplanes to the Hawaiian Islands will be undertaken this summer. The planes will take off from either San Diego or San Francisco. Two planes will have been developed at the Naval Aircraft Factory in Philadelphia will participate in the flight while a third which will be building at the plant of the Boeing Airplane Company

in Seattle will be used if completed in time for the initial attempt.

The nonstop flight to Honolulu will be undertaken as a full scale test of the type of planes to have been developed under the Bureau of Navigation. The planes will be the long distance patrol types developed for system scouting operations from a land base. This is a particular place of Naval aviation development which has been in progress under the Bureau of Navigation for several years. It is the Bureau of Navigation which has been responsible for the development of aircraft free of the influence of the Bureau of Ordnance. The Bureau of Ordnance has developed planes which has been termed the "air cruiser" of the Navy. They are long range transports and are designed to incorporate seafariously qualities when landing and taking off from the water. Long distance flights such as the one planned as a test of these machines will be the normal function of these planes, in all other respects.

The personnel who will take part in the flight will be selected and detailed in this duty by the Commandant of the Aircraft Squadrons Flying Fleet and the Commander of the Aircraft Squadrons Reserve Fleet. According to present plans the planes from the Naval Aircraft Factory will be shipped to San Diego for assembly and not the latter part of April. These planes are known as the PNP type. The type is a biplane with a single engine, having a maximum load of five men and weight fully loaded 31,000 lb. or slightly over twice that of which fifty per cent in naval load. Its Packard engines are rated at 475 hp but actually develop over 600 hp, giving a maximum speed of 137 mi/hr. and a cruising speed of 80 mi/hr.

The PNP is based on untried series of models beginning with the first type built during and after the War for patrol and escort duty. The first production of the PNP is a combination of wood, metal and fabric. The wings are of wood and fabric, the body or hull is entirely of metal and the tail surfaces are of metal and fabric.

The Flying type which is under construction in Seattle is expected to be capable of making 2500 mi as a nonstop flight. It will incorporate several interesting features among which is the placing of the main engine in front of the propeller so that when in the air one of the propellers will be always held down for easier adjustments. This arrangement is also expected to make for economy in fuel consumption at cruising speeds.

Cuban Map

Three hundred miles of the coast line of Cuba and adjacent islands will be mapped photographically from the air by a Navy plane this spring. The work will be done in cooperation with the Navy Hydrographic Office, which for some years past has been mapping the coast and island areas of the sea and land areas in the Caribbean. A Navy hydrographer from the Naval Air Station at Hampton Roads will be sent for this work by Lieut. (junior grade) John D. Hyatt of the Naval Air Station at Pensacola. The Lieutenant Hyatt left Hampton Roads by air for Cuba, arriving at the Gulf of Matanzas on April 10. He will use the Fairchild aircraft on April 11. The area to be mapped will include Cuba, Hispaniola, the southern coast of the Yucatan Peninsula, the northern coast of the Isle of Pines, and islands to the north and northeast of the Isle of Pines. It is anticipated that this work will take from a month to six weeks. After the photographic work is completed, plans will be developed and printed by the Naval Air Station. Plans will be given to the Hydrographic Office for anomaly and control points. Use of aerial mapping cameras is aircraft makes it possible to secure infinitely greater detail of the coastline, including shoals, channels, etc. than is possible by the usual method of surveying on the ground or with boats. The results indicate that the aerial maps will be the type of vegetation extending to the water edge, and the type of vegetation occurring in the completed aerial mosaic photographs map.

This is the second year that Naval planes have cooperated with the Hydrographic Office in surveys made in the Caribbean, very valuable photographic maps being obtained last year by Navy planes of portions of the Cuban coast line.



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